

Remarks

Reconsideration of the rejection of the claims is requested. Claims 4,5,11 and 12 have been cancelled by this amendment. Claims 16 and 17 have been added by this amendment. Consequently, claims 1-3, 6-10, 13-15, and 16-17 are in the case.

Claims 1,2,5,6,7,9,12,13 and 14 stand rejected under 35 USC 102(b) as being anticipated by U.S. Patent No. 6,465,898 issued to Hnilo et al. Hnilo et al shows the use of alignment marks (301 and 302 of Fig 3, and 400 of Fig 4) to facilitate wire bonding. The marks are formed at the same time as an active metal layer (411), and a passivation layer (412) is formed over the active metal, but not the alignment marks (400). Examiner claims that the reference teaches alignment marks formed “in” the passivation layer, and also teaches the features of the claims cited.

While applicants do not necessarily agree that the marks are formed “in” the passivation layer, claims 1 and 9 have been amended to incorporate the significant features of claims 4 and 11, respectively. In particular, claim 1 now specifies that the alignment marks are formed by depositing a material (e.g., 14 of Fig 5) over an underlying passivation layer (e.g., 13) and then covering with a top passivation layer (e.g., 21) to form bumps (e.g., 50) which comprise the alignment marks along with the material. Similarly, claim 9 now specifies that the chip includes underlying and top passivation layers, and alignment marks including a material deposited over the underlying passivation layer and covered by the top passivation layer to form bumps in the top passivation layer.

Examiner has apparently recognized that Hnilo et al does not teach these features by not citing claims 4 and 11 in his rejection. It is also important to note that Hnilo et al actually teaches away from this embodiment by specifying that the marks should not be covered by the passivation layer in order to improve definition of the marks. (See col. 3, lines 22-25.)

Consequently, the amended claims should be allowable over Hnilo et al.

Claims 1,3,4,5,8,9,10,12 and 15 stand rejected under 35 USC 102(b) as being anticipated by U.S. Patent No. 5,346,858 issued to Thomas et al. Thomas et al shows a semiconductor device that includes a passivation layer (12), a metal layer (15) formed over the passivation

layer, and alignment marks (19) formed by etching through the metal layer (Fig 6). Examiner contends that this reference discloses forming alignment marks in the “passivation” layer (15). Regarding former claims 4 and 11, Examiner contends that material (15) is formed over the underlying passivation layer (12) and then covered by the top passivation layer.

It is submitted that the reference does not teach or suggest the invention of amended claims 1 and 9. First, layer 15 is a metal (col. 2, lines 45-48), and metal layers are not generally used as passivation layers in semiconductor devices. Second, even if the layer 15 could be considered a passivation layer, the amended claims clearly distinguish over the cited structure. In the claimed invention, there is an underlying passivation layer, a material deposited over the underlying layer, and a top passivation layer formed over the material so as to form bumps over the material. (See, e.g., Fig 5 and p. 5, lines 10-18 of the present application.) In the reference, the only “material” is the top layer (15) itself. Therefore, there is no covering of the material by the top layer in order to form the alignment bumps over the material. It is believed that the amendments to the claims clarify this distinction.

Consequently, amended claims 1 and 9 should be allowable over Thomas et al.

Since it is shown that claims 1 and 9 are allowable over the cited references, claims 2,3,6-8,10, and 13-15 which are dependent thereon should also be allowable without the need for further discussion. It is pointed out in passing, however, that claims 7 and 14 also specify additional patentable features. These claims provide for rectangular portions (e.g., 31-34 of Fig 3) at the ends of the crosses, the number of portions indicating the quadrant in which the mark is positioned. Examiner relied on the dual square shape of the alignment marks in Hnilo et al in rejecting these claims. While the inner segments (311-314) of the marks could be considered as crosses, the number of rectangular (square) segments is always the same. It is the rotation of the segments that identifies the quadrant. (See col. 5, lines 7-10.) Also, the segments are adjacent to the sides of the cross, and not at the ends of the crosses as claimed.

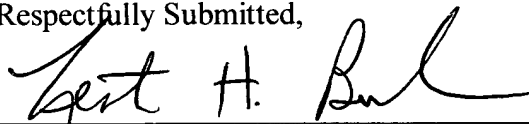
Claims 16 and 17 have been added by this amendment. Claim 16, dependent on claim 2, and claim 17, dependent on claim 9 specify that the alignment marks are used with focused ion beam (FIB) processing, and find support in the specification, for example, at p. 1, lines 14-18, and p. 4 lines 21-25. None of the cited art teaches the use of alignment marks for FIB,

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which, as discussed in the specification, requires a high degree of accuracy. Therefore, these new claims should be given favorable consideration.

Passage to issue is requested.

Respectfully Submitted,

A handwritten signature in cursive script, appearing to read "Lester H. Birnbaum", written over a horizontal line.

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